



ICAO

AIR NAVIGATION BUREAU  
REMOTELY PILOTED AIRCRAFT SYSTEMS

REMOTELY  
PILOTED  
AIRCRAFT  
SYSTEMS



## ICAO RPAS Workshop Group Activity-Case Study

RPAS Flare Stack/Pipeline surveillance operations

PARTICIPANT NAME

ORGANIZATION

### Instructions:

#### Working group activity

- Participants will be divided into separate groups
- A facilitator will be appointed, who will coordinate the discussions and activities of each group
- Using the templates provided, a summary of discussions will be written on electronic forms for their presentation in the plenary sessions. A member of the group (assisted by other members of the group) will brief on the results

#### Objective of the exercise

- Conduct an assessment of three pipeline inspection scenarios with SUAS or RPAS and:
  - a) complete an authorization form.
  - b) fill in the Grid for Unmanned Aircraft Operations according to each scenario.
  - c) propose the appropriate limitations for the operation.

#### Time allocated

- 04:00 hours

#### Scenario

- o Scenario 1 – Flare Stack Inspection
- o Scenario 2 – VLOS Pipeline Inspection
- o Scenario 3 – BVLOS international pipeline inspection with ATM coordination



## Scenario 1 – Flare Stack Inspection

Flare stacks are structures that serve as safety devices in refineries, oil rigs and at other petrochemical facilities. They burn off excess hydrocarbon gases which cannot be recovered or recycled. Excess hydrocarbon gases are burnt in the flare systems as an alternative to releasing gas directly into the atmosphere. Historically, flare stacks have been inspected by cranes, helicopters or sometimes with scaffolding requiring an expensive shut down of the operation and a dangerous environment for the inspector.

### Request

A local UAS operator has contacted the State Civil Aviation Authority (CAA) along with a large petroleum company regarding necessary requirements for an authorization to perform flare stack inspections on their privately owned property. The request includes inspection of 10 flare stacks at their refining plant and at remote drilling operation sites. The inspections will be performed by a Walkera Scout X4 UAS in order to perform routine inspection of the flare stack structure, lights, guy wires and flare heads with high definition cameras. The operator is also initiating a trial of continuous structural inspection and monitoring, recording the condition of the structure's welds and bolts, allowing the analysis to be performed with greater detail and accuracy by civil engineers at the petrochemical company's laboratory. All inspections will be performed during daylight hours in visual meteorological conditions (VMC) within visual-line-of-sight (VLOS) of the UA pilot.

### Operator

The operator is a large civil engineering company who also designs, constructs and inspects oil infrastructure equipment and pipelines. They have just recently expanded in UAS operations to better and more economically serve their customer's needs. The pilots and observers are employees of the operator and have completed the manufacturer's training program.

### CAA considerations

Evaluation of UAS operations for flare stack inspections in a remote, low altitude, VMC, VLOS environment. Approval and authorization of UAS flare stack inspections would advance the public interest by significantly reducing the hazards and risks associated with flare stack inspection. Using a small UA would reduce inspection costs for the petrochemical company and would allow for safer and more frequent inspections.



## **OPERATIONAL INFORMATION**

### **Inspection of Guy-Supported Flare Stacks Using Small UAS**

Maximum Height of Operations: below 400 ft AGL

Location: REMOTE (away from airports and controlled airspaces)

Category of RPA: Small (weight < 2.27 Kg)

Operating Range Required: Very Localized Operation (less than 100 m)

Operations over populated areas or persons: NOT REQUIRED (controlled)

Operations within VLOS of the Remote Pilot (Observers available if required)

Remote Pilots and Remote Observers have completed UAS Training

**VLOS / RLOS / DAYLIGHT VFR SUAS OPERATIONS IN  
UNCONTROLLED AIRSPACE**

# WALKERA SCOUT X4



## WALKERA SCOUT X4 - SPECIFICATIONS

- Remote control: DEVO F12E FPV **Transmitter 2.4 GHz** and Video at 5.8 GHz
- Support both Apple IOS and Android based devices
- Waypoint mission planning / Designated flight
- Follow Me Mode / Record Track Back To Home
- Hybrid, can be changed from 4 for to 8 motors
- 2.4 Bluetooth data link ground station (BT-2401A/B FCC / BT-2402A/B CE)
- **Flight time: Up to 25 minutes**
- **Flight range: up to 1500 m**
- Receiver: DEVO-RX707(CE) / RX709(FCC)
- **Real time flight data (telemetry) monitoring**
- **Auto return to home (RTH)**
- Motors: Brushless WK-WS-34-002
- Battery: 6 cell 22.2V 5400 mAh Li-Po
- iPad holder with backup power
- Size: 335x335x275 mm.
- Rotor Blades Length: 233 mm
- Weight with battery: 1770 g
- **Flying Weight: <2.27 Kg**

## Appendix A

### REQUEST FOR AUTHORIZATION FORM

Note.— For details on completing this form, and for definitions of acronyms and abbreviations, see section on Information Required for the Assessment of Authorization following this form.

#### RPAS operator information

1. Name of RPAS operator:

2. State of RPAS operator:

3. Mailing address:

4. Contact numbers:

tel.:

fax:

cell:

5. Email:

6. State of the RPAS operator, RPAS operator certificate number

(attach copy of RPAS operator certificate).

Alternative documents (attach copy).

#### RPAS information

7. State of Registry and aircraft registration (attach copies of certificate of registration and certificate of airworthiness).

Alternative airworthiness documents (attach copy).

8. Aircraft radio station licence number (attach copy of aircraft radio station licence):

9. Noise certificate (attach copy of certificate).

#### Remote pilot(s) and RPA observer(s) information

10. Name:

11. Type of licence or certificate and number (attach copy of licences or certificates):

12. Experience of remote pilot or RPA observer (detailed description):

a)

a)

a)

b)

b)

b)

#### RPA performance characteristics (including appropriate units of measurement) (attach picture or sketch of RPA)

13. Type of aircraft:

14. Maximum take-off mass:

15. Wake turbulence category:

16. Number and type of engine(s):

17. RPA dimensions (wing span/rotor diameter):

18. Maximum speed:

19. Minimum speed: 20. Cruising speed:
21. Typical and maximum climb rates: 22. Typical and maximum descent rates:
23. Typical and maximum turn rates: 24. Maximum aircraft endurance:
25. Other relevant performance data or information to declare (maximum operating altitude):
26. CNS capabilities (including alternate means of communication with remote pilot station(s)):  
Communications: CPDLC VHF UHF SATCOM HF Telephone: landline mobile phone
- Navigation: DME VOR GNSS ADF ILS GBAS RNAV RNP RVSM
- Surveillance: transponder mode(s): ADS-B ADS-C ACAS
- Other:
27. Detect and avoid capabilities:

### Operations

28. Purpose of operation:
29. Aircraft identification to be used in radiotelephony, if applicable:
30. Date of flight(s): 31. Duration/frequency of flight(s):
32. Flight rules: I V Y Z 33. Type of operation: VLOS BVLOS
34. Number and location(s) of remote pilot station(s):
35. Handover procedures between remote pilot stations:
36. Point of departure: 37. Point of destination:
39. Route: 40. Cruising level:
41. Payload information/description:

### Use of communication capabilities

42. ATS communications:
43. Command and control (C2) link:
44. Communications between remote pilot and RPA observer, if applicable:
45. Payload data link:

### Contingency and emergency procedures

- 46. Loss of C2 link (partial or total):
- 47. Failure of ATC communications (partial or total):
- 48. Failure of remote pilot/RPA observer communications:
- 49. Other emergencies:

### Security measures associated with the RPA operation

- 50. Physical security of remote pilot station(s):
- 51. Physical security of RPA while on the ground:
- 52. Security of C2 link:

### Liability and insurance

- 53. Document number of insurance policy (attach copy of liability and insurance document):
- 54. Attachments:
  - copy of certificate of registration (one for each RPA)
  - copy of certificate of airworthiness (one for each RPA)
  - copy of associated RPAS components certificate(s)
  - copy of RPAS approval
  - copy of RPAS operator certificate
  - copy of aircraft radio station licence(s)
  - copy of licence(s) or certificate(s) of remote pilot(s) and RPA observer(s)
  - copy of all relevant operations specifications
  - rendering or photographic depiction of RPA
  - copy of RPA flight manual emergency procedures
  - copy of liability insurance document(s)
  - copy of RPA noise certificate
  - other attachment(s)
- 55. Signature of applicant:
- 56. Date:





## PROPOSED LIMITATIONS FOR THE OPERATION GROUP #

Scenario #